

Entry

Co-Creating Interdisciplinary Integrated Powerful Knowledge

Premnadh M. Kurup ¹, Xia Li ², Yan Dong ³, Meenu Bhardwaj ⁴ and Yunying Yang ^{5,*}¹ School of Education, La Trobe University, Melbourne 3086, Australia; p.kurup@latrobe.edu.au² Department of Mathematical and Physical Sciences, La Trobe University, Melbourne 3086, Australia; x.li2@latrobe.edu.au³ Faculty of Education, Beijing Normal University, Beijing 100875, China; yan.dong@bnu.edu.cn⁴ Department of International Relations, Chandigarh University, Punjab 140413, India; meenu@cumail.in⁵ School of Information Technology in Education, South China Normal University, Guangzhou 510631, China

* Correspondence: yunyingy@scnu.edu.cn

Definition: Interdisciplinary and integrated powerful knowledge (IIPK) is the outcome of integrating multiple disciplinary perspectives and approaches to tackle challenging real-world issues. Using many disciplinary fields, IIPK is essential for problem solving, innovation, and technical breakthroughs that require careful, imaginative, and innovative application of a wide range of disciplinary knowledge. It is especially relevant when addressing socio-scientific issues, which require a comprehensive understanding of scientific, social, and ethical dimensions. Collaborative and interdisciplinary work among people with diverse backgrounds and expertise is necessary to advance IIPK, including professionals from different academic fields, policymakers, stakeholders, and community members who bring various perspectives and values to the table. The co-creation of IIPK could inform policy making, support informed decision making, and lead to more comprehensive, effective, and sustainable solutions. Theoretical underpinnings and practical applications of co-creating IIPK are discussed here based on several principles with the potential to impact current practices. The co-creation and dissemination of IIPK could use multiple platforms, such as scholarly articles, encyclopedias, and media, including social media. These platforms provide scope for co-creating powerful knowledge through a people participatory approach, which would lead to changes in practices.



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1. Introduction

IIPK is a process of building the capacity to understand the world and make informed decisions for individuals as well as for the community [1]. However, the current structure of schooling and education across the globe presents difficulties in generating IIPK due to the fragmentation of disciplines and the lack of interdisciplinary integration in the curriculum. The curriculum could be expanded upon in a way that favours, directly or indirectly, academic specialisation above interdisciplinary integration [2]. To overcome this, a knowledge-based and integrated framework for the school curriculum is recommended by Nimela [3] in order to make better pedagogical arrangements and base learning on empirical evidence. The essential element is integration, which could result in a foundation for the formulation of conceptual facts and trigger the advancement of technological innovations for changing existing daily practices. This process might concentrate on educational practices and settings, such as schools [4]. Alignment in pedagogy, curricular structure, and the teaching/learning process are all elements that could benefit from an interdisciplinary and integrated approach. To develop effective interdisciplinary and integrated powerful knowledge (IIPK) in educational settings, it is suggested that the leverage of the balance between biotic and abiotic forces that maintain the structure and functions of the natural world should be focused. The living world relies on abiotic substances, such as water, oxygen, and minerals, for growth, maintenance, and sustenance [5]. By identifying connections

between different disciplines and elements associated with a system, we can establish a framework for generating IIPK that can drive changes in practices [1,6]. For instance, we can explore the connections within the solar system in terms of gravity, magnetism, iron cores, movements, attraction, cells, blood, medicines, management, economy, and many more aspects, which will provide opportunities for formulating IIPK in a meaningful way and connected to real-world issues. IIPK eventually provides a platform for generating plans, technological devices (including artificial intelligence), processes, procedures, and protocols for people-friendly scenarios in daily life. The 21st century demands changes in practices and sustainability, and IIPK could help to generate sustainable practices. It is essential to accept and realise the drawbacks from the advancements of the industrial revolution, and to use this to lead to an efficient use of resources in both reversible and irreversible formats. Formulating a dynamic system capable of the efficient utilisation of natural resources and the practices that are required is what led to the co-creation of IIPK, using a blend of traditional knowledge with scientific technological knowledge.

The evolution of knowledge across disciplines can provide a fertile ground for innovation and progress, fueling the development of new technologies, practices, and systems that improve our lives and shape our societies [7]. An illustration of this would be a torch, which is an advanced technological form of an electric circuit consisting of a battery, cables, a globe, and a switch. This transformation of knowledge can result in significant innovations and changes in practice [8]. Co-creating and people participations are needed for the dissemination of such knowledge and platforms, including encyclopedias and social media, which would play vital roles. The accumulation of knowledge is analogous to the growth of a seed into a large tree, which, in turn, produces an ecosystem rich in glucose and oxygen through the photosynthesis of carbon dioxide and water in the presence of sunlight. The tree itself would become an ecosystem of many living creatures, including insects and birds. The tree could be viewed from the perspectives of different disciplines, such as science, society, economy, business, etc., as well as different angles, such as timber, deforestation, fruits, shade, and so on. However, this all started with a seed. The process of acquiring all of this knowledge begins with the acquisition of preceding knowledge, continues with overcoming hurdles that are posed by existing knowledge, and ends with ownership of the knowledge [9]. Ownership of a large body of knowledge can serve as a launchpad for building bridges between disciplines, leading to the development of IIPK [10]. IIPK drives growth and innovation across many disciplines, and as society becomes more complicated and networked, its relevance will only expand [8]. Unprecedented unknown scenarios create challenges and are hurdles for faster developments, but most of these challenges could be effectively solved by using co-created IIPK, which could equip with citizens the capacity and competence to build and shape a better world that is effectively, efficiently, and easily sustainable for the future of the planet [11]. Acknowledgement of the existing knowledge base could enhance co-creating a useful and viable IIPK that can change practices to more widely accepted and usable ones. The dissemination of IIPK through various platforms, which as encyclopedias and social media, also plays a vital role in efficient, effective, and engaging uses of it. These platforms engage and willingly undertake cooperative people participation, and they could lead to the effective completion of the changes in practice.

2. Influence of IIPK in Informed Decisions

The COVID-19 pandemic and the start of the 21st century have both provided the education system with chances to consider and change the way that it does things [12]. It is important to realign and move forward with systemic changes in how schools work, what they teach, how students learn, and what they learn. The 21st century framework comprises essential elements, such as respect for others, responsibility, self-management, perseverance, and system thinking, and it acts as a laser for guiding these changes [13]. COVID-19 has forced us to find new ways and paths in every field of practice worldwide [14]. Instead of reverting to old practices, it is better to identify and emerge with better practices that can sustainably address the challenges of our planet. Combining 21st century skills [15] with

IIPK could lead to a new world practice that can make changes to existing practices in a smoother, faster, and more efficient way. The current scenario presents an opportunity to use the forced efforts during COVID-19 to create platforms and frameworks for essential changes in practices. It is crucial not to revert to the “normal” but, rather, to move forward with the changes that have already been made [16]. In this context, formulating and co-creating IIPK is the key to fixing and opening new doors for a suitable future world.

Decision making is an essential component of the sustainable existence of this planet and its dynamic equilibrium of biotic and abiotic existence [5]. Abiotic elements, such as water and carbon dioxide, along with solar energy in green leaves, fundamentally drive photosynthesis in plants, which, in turn, enables the creation of various kinds of life. Concerns relating to the socio-scientific domain, such as health and well-being, the management of natural resources, and the efficient application of technology in energy consumption, call for an integrated approach to problem solving and the development of new practices [17]. To achieve this, administrators, practitioners, and policymakers should engage in the development of cocreating IIPK. By effectively utilizing IIPK, evidence-based decision making can lead to technological advancements, protocols, and systems that solve complex scenarios [18]. Using IIPK and expertise can also lead to improvements in how things are undertaken now and also in the future. It can be used as a useful framework to help people understand and make decisions about complex situations, especially in socio-scientific issues, where evidence from discipline knowledge is important [19]. Effective utilisation of these knowledge bases requires building and integrating IIPK into existing practices, providing a rich platform for reform [20]. While IIPK already plays a role in everyday experiences and changes in practices, its effective use can also lead to better decisions and practices [21]. A people participatory approach would be an enabler in co-creating IIPK and could be widely used in the majority of informed decisions connected to the environment, health and wellbeing, policy, politics, and market economy awareness. This approach could be a gamechanger in building a dynamic society capable of making informed decisions. An informed decision-making capacity is an integral part of building a powerful knowledge-based society that could save this planet.

3. Aspects of Co-Creating IIPK

IIPK can be co-created in order to enhance the understanding and influence of scientific and technological knowledge, with the participation of academics, government, industry, and citizen actors [22]. Co-creation involves various dimensions, such as policy development, research outputs, innovation, and action pledges [23]. It can cover diverse aspects of various academic disciplines, industries, R&D, and engagement policies. The coexistence and sustainability of the planet require IIPK. Different tools and enablers can be used to co-create changes in practice through these five steps:

1. Conduct a needs assessment of the required changes in practices based on the current situation and the desired outcomes, with the active participation and input of all key stakeholders from different sectors and backgrounds.
2. Identify the relevant disciplinary domains and experts that can contribute to the co-creation process and establish a common understanding and framework for integrating their knowledge bases into a coherent whole.
3. Analyze the existing policies that affect or relate to the co-creation process, identify the gaps, challenges, and opportunities for policy innovation, and develop new or revised policies that explicitly support and guide the changes in practice towards sustainability goals.
4. Create an interdisciplinary knowledge base that can inform and inspire action for change. This knowledge base should include both theoretical and practical insights from various disciplines, as well as tools and methods that can facilitate collaboration and implementation.

5. Apply and evaluate the co-created IIPK in real-world contexts, generate innovations that can enhance the sustainability of the plane, and engage in continuous learning and improvement based on feedback and reflection.

The co-creation of such a knowledge base can face many challenges from existing beliefs, prior knowledge, and conventional wisdom. Some of these factors can act as serious obstacles as well. The co-creation process can be enhanced by engaging with the community, media, and academic platforms, such as encyclopedias [24]. Instead of academic journals, encyclopedias that are accessible and understandable to the public can create a more effective and inclusive knowledge base. Encyclopedias not only played the role of transmitting the knowledge base but also play a successful role in boosting the authenticity of the knowledge base. Open systems with open views can foster an ecosystem of co-creation. This is the foundation for powerful knowledge that can lead to changes in practice. This system and ecosystem can produce co-created IIPK. The co-created IIPK is essential for enabling participatory growth in all societies, regardless of their existing systems [25].

To create a dynamic system that can positively impact the planet, it is essential to incorporate both vertical and horizontal layers of the social life world [7,25]. The COVID-19 pandemic has highlighted this need, as it has affected people of all races, cultures, religions, and governmental systems around the world [12]. Citizen engagement is crucial for cocreating IIPK, but it requires a conceptualization of knowledge that fosters engagement in knowledge production to support changes in practice [26]. Each subsystem must develop a suitable and contextualised approach to building and co-creating the IIPK because there is no one-size-fits-all solution to global issues and problems [27]. Achieving a sustainable equilibrium in such a complex and dynamic system is an ongoing challenge that requires deliberate intervention and constant attention [5,28].

4. The Overall Picture

Figure 1 illustrates the key elements and aspects involved in generating IIPK. The process of knowledge creation can begin with discipline-based knowledge, which provides the foundational concepts and methods for understanding different domains of inquiry. However, discipline-based knowledge alone is not sufficient to address complex and multifaceted issues or problems that require innovation and creativity. Therefore, the next step is to formulate integrated interdisciplinary knowledge that synthesises and integrates insights from multiple disciplines in a coherent and meaningful way. Such knowledge is powerful because it can challenge and transform existing practices and paradigms. To co-create this powerful knowledge, it is essential to have a collaborative and participatory approach that involves all relevant stakeholders in the process of knowledge generation and dissemination. This way, a co-created IIPK can have a positive impact on society and can contribute to a sustainable future. The created IIPK can be compared to a laser beam that emerges from multiple rays of light and has the capacity to change reality.

The IIPK could evolve from a toolkit of disciplinary, interdisciplinary, and everyday aspects of the knowledge base to a powerful knowledge co-created by all stakeholders. The IIPK could essentially lead to changes in existing practices. Educators, experts, policymakers, the general public, politicians, and all of the stakeholders would be involved in any of the forms of co-creating IIPK that are connected to a societal issue. This could be a people participatory collaborative effort that should be willingly undertaken by the stakeholders. A deliberate effort is needed to formulate the IIPK on a specific societal issue (which could be environmental, educational, or in the fields of health and wellbeing, construction, policy, etc.). This would be a process in which a combination of discipline knowledge would be focused in order to formulate an interdisciplinary knowledge base. This interdisciplinary knowledge would need to align with existing age-old traditional knowledge in building and formulating a powerful knowledge base. The final product would be a people participatory and cocreated IIPK toolkit. This toolkit would be an enabler for changes in practice in a 21st-century scenario. Post-industrial revolutionary

practices caused damage to the environment and some of this damage is irreversible, but careful approaches could still build a sustainable future.

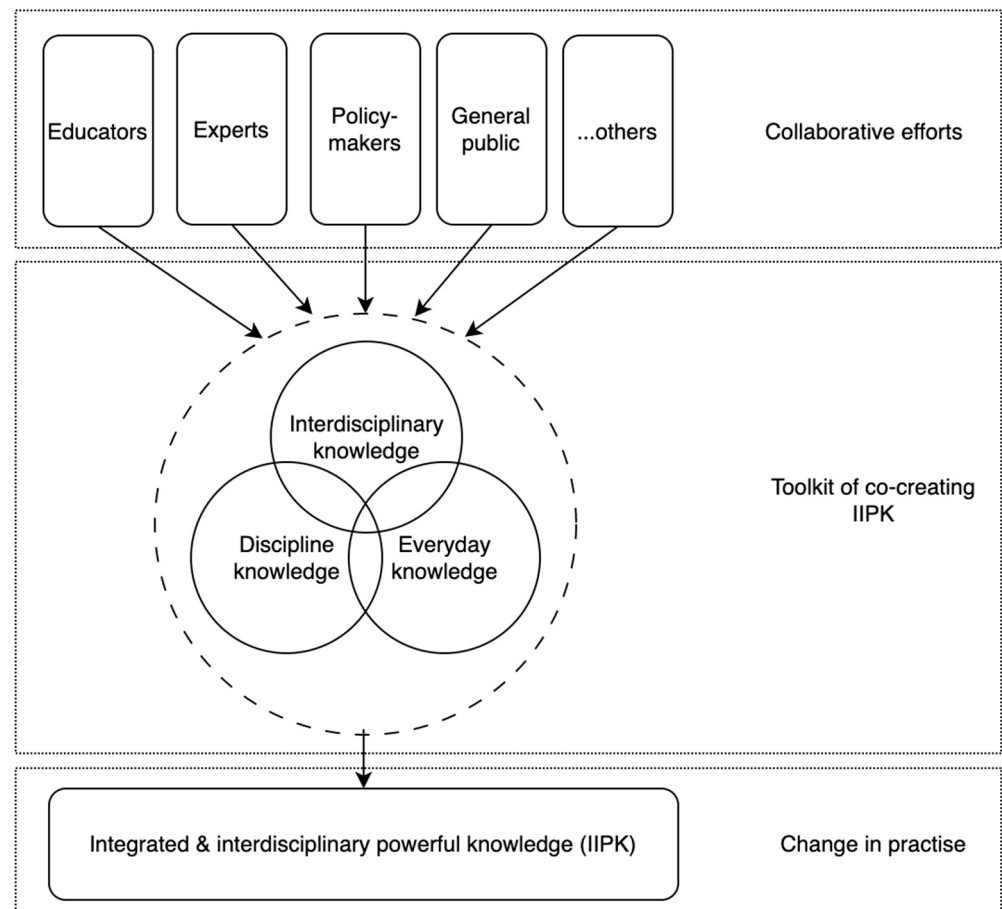


Figure 1. Overall aspects of co-creating IIPK.

The process of co-creating a powerful IIPK can be summarised in the following steps:

1. Identify a societal issue that requires innovation and potential solutions that address its root causes and its consequences.
2. Involve society and the citizens in recognising and valuing the traditional knowledge base and practices that are relevant to the issue and its solutions.
3. Formulate a disciplinary and interdisciplinary knowledge base and practice that incorporates and respects the traditional aspects while also expanding and enriching them with new perspectives and methods.
4. Generate and co-create a powerful IIPK that is acceptable to all stakeholders and that can inform decision making for effective action. In this context, dissemination of IIPK using various platforms, such as encyclopedias and social medias plays an important role.
5. Produce a toolkit with policies that can facilitate changes in practice based on the powerful IIPK.
6. Overall, a collaborative platform including all stakeholders could use a toolkit of co-created IIPK to solve social issues and problems, and it would result in changes in practices. These practices would be long lasting and sustainable, and they would not only produce advanced technological development but would also affect the practices, policies and protocols of every aspect of daily life of everyone on this planet. Essentially, the co-created IIPK would produce scope for a sustainable use of natural resources, and it would keep the natural dynamic equilibrium in balance.

5. Conclusions and Prospects

This article has discussed the concept and process of co-creating IIPK as a way of addressing complex and multifaceted issues that require innovation and creativity. IIPK is essential for problem solving and innovation in various fields, especially when dealing with socio-scientific issues that involve scientific, social, and ethical dimensions. The article has also highlighted the challenges and opportunities of collaborative and interdisciplinary work among people with diverse backgrounds and expertise, including professionals from different academic fields, policymakers, stakeholders, and community members. The article has proposed several principles for co-creating IIPK that can inform policy making, support informed decision making, and lead to more comprehensive, effective, and sustainable solutions.

However, co-creating IIPK is not an easy task. It requires a paradigm shift in education and research that values interdisciplinary integration over disciplinary specialization. It also requires a participatory approach that respects and incorporates the perspectives and values of different stakeholders in the process of knowledge generation and dissemination. Moreover, it requires a critical evaluation of the quality and impact of IIPK on society and the environment. Therefore, future research should explore how to foster a culture of co-creation among students, educators, researchers, practitioners, policymakers, stakeholders, and community members. The effective dissemination of IIPK using effective platforms, such as encyclopedias and social media, could generate both authenticity and ownership for all of the stakeholders. Future research should also examine how to assess the outcomes and the benefits of co-creating IIPK for individuals as well as for communities.

Examples of co-creating can be found in the use of the 5P Approach (Participation, Policy, Procedure, Process, and Practices) in formulating a people-friendly knowledge base and test kit connecting and engaging with all stakeholders for a water pollution scenario [29]. The 5P approach could be an authentic enabler for a people participatory co-created IIPK, and this approach has a wider use in many other societal issues. Another example could be identified from the requirement of agentic actions to initiate innovative strategies for empowerment and commitments in developing IIPK [30]. The agentic action could evolve from many platforms and fields, and it could build the capacity of informed decisions [31]. The 5P approach and agentic actions are complimentary to co-creating a people participatory scenario for changes in practices suiting 21st-century demands. These changes are highly necessary in many issues facing the whole world today, such as societal issues that are universal, including climate change, pandemics (such as COVID-19), economic issues, etc. In medicine, especially, more than a highly specialised approach, it is better to focus on issues with an integrated whole person (i.e., physical, mental, social, emotional, and spiritual) health approach. In solving these issues, formulations of people participatory and co-created IIPK could enable collective, long-lasting, sustainable, and acceptable solutions.

Overall, co-creating IIPK is a promising avenue for advancing knowledge that can make a positive difference in the world. By integrating multiple disciplinary perspectives and approaches in a coherent and meaningful way, co-creating IIPK can challenge and transform existing practices and paradigms. By involving all relevant stakeholders in the process of knowledge creation and dissemination, co-creating IIPK can have a positive impact on society and contribute to a sustainable future.

The key takeaways in formulating and co-creating people participatory IIPK could be as follows:

1. Empowering all stakeholders with the 21st-century skills that are essential components in moving forward, and making changes to the practices of the industrial revolution and the damages that ensued.
2. Building a capacity of informed decision making in all forms of issues.
3. The ability to accept people participatory co-creating and approaches such as the 5P one for dealing with personal or societal issues.

4. Facilitating agentic actions, and using IIPK to ensure commitment to, participation in, and co-creation of changes in practice.
5. Create people participatory and co-creating approaches to societal issues, and generate toolkits for resolving these issues. In this context, the dissemination of IIPK through encyclopedias and social media will play a vital role.

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